

(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization  
International Bureau



(43) International Publication Date  
7 December 2000 (07.12.2000)

PCT

(10) International Publication Number  
**WO 00/74348 A1**

(51) International Patent Classification?: **H04L 29/08**,  
12/44

(74) Agent: **POWSNER, David, J.**; Choate, Hall & Stewart,  
Exchange Place, 53 State Street, Boston, MA 02109 (US).

(21) International Application Number: **PCT/US99/15626**

(81) Designated States (*national*): AE, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CU, CZ, DE, DK, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, UA, UG, UZ, VN, YU, ZA, ZW.

(22) International Filing Date: **8 July 1999 (08.07.1999)**

(25) Filing Language: **English**

(26) Publication Language: **English**

(30) Priority Data:  
60/136,214 26 May 1999 (26.05.1999) US  
09/347,241 2 July 1999 (02.07.1999) US

(84) Designated States (*regional*): ARIPO patent (GH, GM, KE, LS, MW, SD, SL, SZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG).

(71) Applicant: **XBIND, INC.** [US/US]; Suite 13C, 55 Broad Street, New York, NY 10004 (US).

Published:

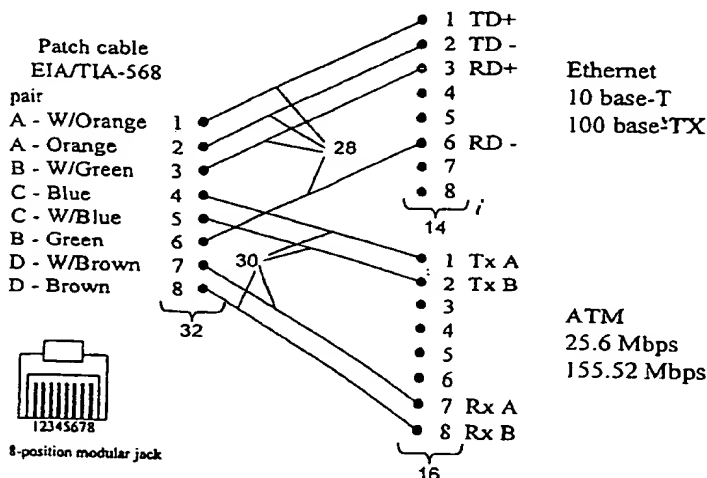
— With international search report.

(72) Inventors: **LAZAR, Aurel, A.**; Suite 32A, 410 Riverside Drive, New York, NY 10025 (US). **HUARD, Jean-Francois**; Apartment #37, 200 Claremont Avenue, New York, NY 10027 (US).

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

(54) Title: **METHODS AND APPARATUS FOR CONCURRENT ACCESS TO MULTIPLE NETWORKS**

### Schematic of Wiring for Concurrent Access Using a Single Twisted Pair Cable



(57) Abstract: Apparatus and methods to provide concurrent access to multiple networks (e.g., Internet and ATM networks) by using a single twisted pair cable. Connectors according to the invention map the wiring for accessing multiple switches (e.g., an Ethernet switch and an ATM switch) into the same twisted pair cable.

WO 00/74348 A1

## METHODS AND APPARATUS FOR CONCURRENT ACCESS TO MULTIPLE NETWORKS

5

This application claims benefit of copending and commonly owned U.S. Provisional Application No. 60/136,214, filed May 26, 1999, entitled "Concurrent Access to Internet and Atm Networks Using Twisted Pair Cable," which is incorporated herein by reference.

10

### Background of the Invention

The present invention pertains to network communications, and particularly to wiring and connector technologies for facilitating access to Internet, ATM, and other networks.

15

A PC, workstation, or other intelligent appliance is often connected to a network for the exchange of information, frequently by a cable containing multiple conductors, such as a twisted-pair cable (*e.g.*, UTP category 5 cable). Signal sets which are commonly carried over such cables include those compatible with ethernet, Asynchronous Transfer Mode (ATM) and other network link layer protocols.

20

Laying cable through an office or home environment to create a network is both expensive and disruptive. When changing an entire system from an Ethernet network to an ATM network (or vice versa), existing cables can sometimes be reused to avoid this procedure. However, existing cabling infrastructure cannot generally be used for *concurrently* carrying signal sets compatible with multiple network protocols. For example, IP-based and ATM-based signal sets cannot normally be carried over the same cable, because these signal sets are conventionally carried on overlapping sets of conductors. If it is desired to access the Internet, via ethernet, and ATM networks simultaneously (or other combinations of networks), multiple cables must be used.

25

30

An object of this invention is to provide improved wiring and connector apparatus and methods for network communications.

5 A further object is to provide such apparatus and methods as facilitate carrying multiple network signal sets with minimal capital outlay.

Still yet a further object of this invention is to provide such apparatus and methods as permit the transfer of multiple network signal sets in a manner compatible with existing communications equipment.

Summary of the Invention

5 The present invention addresses the foregoing needs by providing concurrent access to multiple network signal sets (e.g., for Ethernet and ATM networks) using a single twisted pair cable. This is achieved by mapping the signals into non-overlapping conductor sets within the same twisted pair cable.

10 In one aspect, the invention provides a cable system for carrying at least two signal sets that normally use overlapping sets of conductors. The system includes four connectors coupled to a common cable, two for each signal set. The connectors have pins carrying the signal sets, which are connected to nonoverlapping sets of conductors in the common cable. The conductors of the common cable may share a common sheath, as in a typical twisted pair cable such as UTP category 3 or category 5 cable.

15 In one configuration according to the invention, the system is designed to provide concurrent access to IP and ATM networks by carrying Ethernet signal sets and ATM signal sets over a single common cable. The system includes four connectors and a common cable. Two of the four connectors have pins that carry the Ethernet signal set and are coupled to a first set of conductors of the cable, and the other two of the connectors have pins that carry the ATM signal set and are coupled to a second set of conductors of the cable. The two sets of conductors are nonoverlapping; that is, they have no conductors in common.

20 The invention further provides connectors for coupling to a cable according to similar schemes. Each such connector comprises two connections: one for coupling pins carrying each signal set to conductors in the cable, where the normal pins for carrying the signal sets overlap, but the connector couples them to nonoverlapping sets of conductors in the cable. The connections may take a variety of physical forms, such as jacks, sockets, patch cords, cables, and other connectors.

25

30

In addition, the invention comprises a kit for connecting two or more intelligent appliances to multiple networks, where the kit includes two or more connectors of the type described above.

5           The foregoing has outlined some of the more pertinent aspects of the present invention. These aspects should be construed to be merely illustrative of some of the more prominent features and applications of the invention. Many other beneficial results can be attained by applying the disclosed invention in a different manner or modifying the invention as will be described. Accordingly, other aspects and a fuller  
10           understanding of the invention may be had by referring to the following Detailed Description.

**Brief Description of the Drawing**

The invention is described with reference to the several figures of the drawing,  
in which,

5

**Figure 1** depicts the typical configuration of connecting a PC to two network access points using two separate twisted pair cables;

10

**Figure 2** shows the wiring diagram for connecting a PC to an Ethernet switch or hub using twisted pair cable;

**Figure 3** depicts the wiring diagram for connecting a PC to an ATM switch using twisted pair cable;

15

**Figure 4** shows the preferred embodiment of a PC with concurrent access to an Ethernet switch or hub and an ATM switch using a single twisted pair cable; and

**Figure 5** depicts the preferred embodiment of the wiring diagram for concurrent access of an Ethernet switch or hub and an ATM switch.

### Detailed Description

5 This invention provides apparatus and methods of local access that allow the concurrent access to two or more network services (e.g., IP and ATM) using a single twisted pair cable. It can be used for connecting any type of electronic device (intelligent appliance), including, but not limited to, desk-top personal computers, laptops, digital telephones, digital televisions, and video-conferencing equipment, to the Internet or to ATM networks. For the sake of brevity, however, the invention will be described in the context of a networked desktop computer system only, with  
10 reference to a combination of IP and ATM based networks, using UTP category 5 cable, and 10/100Base-TX and ATM-25/155 UTP cabling schemes. It is easily understood that any combination of the above can be used for concurrent access to two or more networks of the same or different types.

15 **Figure 1** shows a representative embodiment of a PC that includes network connections for interfacing with the Internet and/or ATM network. The PC also includes display screen **20** for displaying information to the user, keyboard **22** for inputting text and user commands, mouse **24** for positioning a cursor on display screen and inputting user commands, and disk drive **26** for reading from and writing to floppy disks installed therein. The PC may also have one or more peripheral  
20 devices (not shown) attached thereto for inputting text, graphics images, or the like, and a printer attached thereto for outputting images.

25 When using twisted pair technologies, local access to the Internet or an IP network via an Ethernet **14** hub or switch or XDSL modem is realized with a wiring scheme as depicted in **Figure 2**. Typical access rates are 10Mb/s or 100 Mb/s but higher rates such as 1 Gb/s are also possible.

30 ATM local access using twisted pair cable is realized by a wiring scheme as depicted in **Figure 3**. Typical access rates are 25Mb/s and 155 Mb/s are used although other rates are also available.

As evident from **Figures 2 and 3**, concurrent local access to IP and ATM-based networks has not conventionally been thought to be possible using a single twisted pair cable. This is because wire pair A, using wires denoted 1 and 2, is used by both the Ethernet and ATM access to these networks. Systems in accord with the invention overcome this.

In an embodiment of this invention, circuit board pinouts or other connections (e.g., on NICs), jacks, plugs, sockets, patch cords, connectors or other apparatus are utilized to route multiple network signals to non-overlapping conductors in a common cable, e.g., a UTP category 3 or category 5 cable. This facilitates coupling with a single cable PCs or other apparatus, e.g., employees' workstations, to multiple centralized network servers, e.g., residing in an MIS or IT department. Through use of such apparatus, for example, an office wired for Ethernet access can be readily equipped to provide ATM access, as well, without running separate cabling for the additional network.

Figure 4 depicts a system utilizing the invention. In the system, two NICs 10,12 are present: one connects the PC to the Internet and the other to an ATM network. The local access to the Ethernet switch 14 and ATM switch 16, depicted in **Figure 4**, is based on four wires each 28,30 that are mapped into an eight wire (4 pairs) twisted pair cable 32. This allows the concurrent access of an intelligent appliance such as a PC or a workstation to IP and ATM-based networks.

The detailed wiring diagram is shown in **Figure 5**. It can be embodied in circuit board pinouts or other connections (e.g., on NICs), jacks, plugs, sockets, patch cords, connectors or other apparatus, e.g., at each end of a common cable. In the preferred embodiment of the invention, wire pairs A (wires 1 and 2) and B (wires 3 and 6) are used for access to IP network services whereas wire pairs C (wires 4 and 5) and D (wires 7 and 8) are used for access to ATM network services. These wire pairs are coupled to the standard pins on external connectors for each of the Ethernet and ATM signal sets. (As used herein, the term "pin" includes any of the many structures known in the art for electrically connecting to a single conductor of a cable).



In a preferred embodiment for use with UTP category 5 cable, wiring within the connector is twisted on a per-pair basis. For example, the wires forming wire pair A must be twisted together, as must those forming each of pairs B, C and D.

5           Other wiring schemes can also be used as long as two pairs are reserved for access to IP networks and two pairs for access to ATM networks. Furthermore, not only concurrent access to IP and ATM can be accommodated, but also combination of access to two IP-based or two ATM-based access networks. Finally, any application specific pair assignments that uses two pairs, such as 8802-3 (10Base-T), 8802-5  
10 (Token-Ring), FDDI (TP-PMD), ATM 25.6Mbps UTP and ATM 155.52 Mbps UTP, 100Base-TX (802.3u) can be combined together to form concurrent network access.

          IP networks provide transport and signaling services as defined by the Internet Engineering Task Force (IETF) whereas ATM networks provide transport and  
15 signaling services as defined by the ATM Forum. Concurrent access to ATM and IP services greatly increases the potential of ATM and IP-based networks. This potential can be realized by exploiting the synergies of the two networks. For example, signaling services for controlling ATM switching resources can be supported using the IP networking infrastructure. A case in point is a system whereby signaling  
20 information to set ATM Virtual Circuits is transported by IP channels.

          The typical embodiment of the invention allows for the following combination of transport: 10 Mb/s Ethernet with 25 Mb/s ATM, and 100 Mb/s Ethernet with 155Mb/s ATM. Other combinations, such as 100 Mb/s Ethernet and 25Mb/s ATM  
25 can obviously be accommodated as well. Thus, by way of non-limiting example, the invention can be applied to the transport over a single cable of any combination of signal sets according to the following protocols 8802-3 (10Base-T), 8802-5 (Token-Ring), FDDI (TP-PMD), ATM 25.6Mbps UTP and ATM 155.52 Mbps UTP, and 100Base-TX (802.3u).

30

As can be seen from **Figure 5**, other wire combinations that result in the same effect of supporting concurrent access to two different networks are possible. The

only requirement is to use one set of cable conductors for the first network access and similarly a different, nonoverlapping set of cable conductors for the second network access.

5           Other embodiments of the invention will be apparent to those skilled in the art from a consideration of the specification or practice of the invention disclosed herein. Thus, by way of non-limiting example, it will be appreciated that the conductor pair labels, colors and numbers described above are merely examples, and that other combinations can be used instead, in accord with the corresponding standards. It is  
10 intended that the specification and examples be considered as exemplary only, with the true scope and spirit of the invention being indicated by the following claims.

What is claimed is:

Claims

- 1  
2  
3 1. A cable system for carrying a first signal set that is normally carried over a  
4 first set of conductors and a second signal set that is normally carried over a  
5 second set of conductors, where the first and second sets of conductors  
6 normally have at least one conductor in common, the system comprising  
7  
8 a first connector having pins that carry the first signal set,  
9  
10 a second connector having pins that carry the second signal set,  
11  
12 a third connector having pins that carry the first signal set,  
13  
14 a fourth connector having pins that carry the second signal set, and  
15  
16 a common cable comprising a plurality of conductors, a first set of which are  
17 coupled to the pins of the first and third connectors, and a second set of which  
18 are coupled to the pins of the second and fourth connectors, where the first and  
19 second sets of conductors have no conductors in common.  
20  
21 2. A cable system according to claim 1, wherein the common cable comprises a  
22 plurality of conductors surrounded by a common sheath.  
23  
24 3. A cable system according to claim 2, wherein the common cable comprises a  
25 single twisted pair cable.  
26  
27 4. A cable system according to claim 3, wherein the common cable comprises  
28 any of a UTP category 3 cable, and UTP category 5 cable.  
29  
30 5. A cable system according to claim 4, wherein  
31

1 the first set of conductors are coupled for signal transmission with the pins of  
2 the first and third connectors, and  
3  
4 the second set of conductors are coupled for signal transmission with the pins  
5 of the second and fourth connectors.  
6

7 6. A cable system according to claim 5, wherein the coupling for signal  
8 transmission comprises electrical coupling.  
9

10 7. A cable system for carrying an IP network signal set that is normally carried  
11 over a first set of conductors and a ATM network signal set that is normally  
12 carried over a second set of conductors, where the first and second sets of  
13 conductors normally have at least one conductor in common, the system  
14 comprising  
15  
16 a first connector having pins that carry the IP network signal set,  
17  
18 a second connector having pins that carry the ATM network signal set,  
19  
20 a third connector having pins that carry the IP network signal set,  
21  
22 a fourth connector having pins that carry the ATM network signal set, and  
23  
24 a common cable comprising a plurality of conductors, a first set of which are  
25 coupled to the pins of the first and third connectors, and a second set of which  
26 are coupled to the pins of the second and fourth connectors, where the first and  
27 second sets of conductors have no conductors in common.  
28

29 8. A cable system according to claim 5, wherein  
30  
31 the IP network signal set comprises signals for any of 10 Mb/s Ethernet and  
32 100 Mb/s Ethernet, and

1 the ATM network signal set comprises signals for any of 25 Mb/s ATM, and  
2 155Mb/s ATM.

3

4 9. A cable system according to claim 8, wherein

5

6 the IP network signal is normally carried on a conductor set in accord with a  
7 10/100Base-TX cabling scheme, and

8

9 the ATM network signal set is normally carried on an ATM-25/155 UTP  
10 cabling scheme.

11

12 10. A cable system according to claim 9, wherein

13

14 the first set of conductors of the common cable comprise a first set of two  
15 twisted pairs of conductors, and

16

17 the second set of conductors of the common cable comprise a second set of  
18 two twisted pairs of conductors,

19

20 the first and second sets of two twisted pairs of conductors having no  
21 conductors in common.

22

23 11. A cable system according to claim 10, wherein

24

25 the first set of conductors of the common cable comprise conductor pairs (1,  
26 2) and (3, 6), and

27

28 the second set of conductors of the common cable comprise conductor pairs  
29 wires (4, 5) and (7, 8).

30

31 12. A cable system according to claim 11, wherein

32

1 conductor pairs (1, 2) and (3, 6) of the common cable are electrically coupled  
2 to same numbered pins of the first connector, and  
3

4 conductor pairs wires (4, 5) and (7, 8) are electrically coupled to pins (1, 2)  
5 and (7, 8), respectively of the second connector.  
6

7 13. A cable system according to any of claims 7 - 9, wherein the common cable  
8 comprises a plurality of conductors surrounded by a common sheath.  
9

10 14. A cable system according to claim 13, wherein the common cable comprises a  
11 single cable of twisted pairs.  
12

13 15. A cable system according to claim 3, wherein the common cable comprises  
14 any of a UTP category 3 cable and UTP category 5 cable.  
15

16 16. A cable system according to claim 15, wherein  
17  
18 the first set of conductors are coupled for signal transmission with the pins of  
19 the first and third connectors, and  
20  
21 the second set of conductors are coupled for signal transmission with the pins  
22 of the second and fourth connectors.  
23

24 17. A cable system according to claim 16, wherein the coupling for signal  
25 transmission comprises electrical coupling.  
26

27 18. A cable system for carrying a first signal set that is normally carried over a  
28 first set of conductors and a second signal set that is normally carried over a  
29 second set of conductors, where the first and second sets of conductors  
30 normally have at least one conductor in common, the system comprising  
31

32 a first connector having pins that carry the first signal set,

- 1' a second connector having pins that carry the second signal set,  
2  
3 a third connector having pins that carry the first signal set,  
4  
5 a fourth connector having pins that carry the second signal set, and  
6  
7 a common cable comprising a plurality of conductors, a first set of which are  
8 coupled to the pins of the first and third connectors, and a second set of which  
9 are coupled to the pins of the second and fourth connectors, where the first and  
10 second sets of conductors have no conductors in common,  
11  
12 the first signal set comprising signals in accord with any of the following  
13 standards: 8802-3 (10Base-T), 8802-5 (Token-Ring), FDDI (TP-PMD), ATM  
14 25.6Mbps UTP and ATM 155.52 Mbps UTP, and 100Base-TX (802.3u),  
15  
16 the second signal set comprising signals in accord with any of the following  
17 standards: 8802-3 (10Base-T), 8802-5 (Token-Ring), FDDI (TP-PMD), ATM  
18 25.6Mbps UTP and ATM 155.52 Mbps UTP, and 100Base-TX (802.3u).  
19  
20 19. A cable system according to claim 18, wherein the first and second signal sets  
21 comprise signals in accord with the same said standard.  
22  
23 20. A cable system according to claim 18, wherein the first and second signal sets  
24 comprise signals in accord with different ones of said standards.  
25  
26 21. A cable system according to any of claims 18 - 20, wherein the common cable  
27 comprises a plurality of conductors surrounded by a common sheath.  
28  
29 22. A cable system according to claim 21, wherein the common cable comprises a  
30 single cable of twisted pairs.  
31  
32 23. A cable system according to claim 22, wherein

1 the first set of conductors are electrically coupled with the pins of the first and  
2 third connectors, and

3

4 the second set of conductors are electrically coupled for signal transmission  
5 with the pins of the second and fourth connectors.

6

7 24. A cable system according to claim 23, wherein

8

9 the first set of conductors of the common cable comprise a first set of two  
10 twisted pairs of conductors,

11

12 the second set of conductors of the common cable comprise a second set of  
13 two twisted pairs of conductors,

14

15 the first and second sets of two twisted pairs of conductors having no  
16 conductors in common.

17

18 25. A connector system for adapting a common cable to carry a first signal set that  
19 is normally carried over a first set of conductors and a second signal set that is  
20 normally carried over a second set of conductors,

21

22 where

23

24 the first and second sets of conductors normally have at least one conductor in  
25 common, and

26

27 the common cable comprises a plurality of conductors surrounded by a  
28 common sheath,

29

30 the connector system comprising

31



- 1 a first connector having pins that carry the first signal set, the pins of the first  
2 connector being coupled to a first set of conductors in the common cable, and  
3  
4 a second connector having pins that carry the second signal set, the pins of the  
5 second connector being coupled to a second set of conductors in the common  
6 cable,  
7  
8 the first and second sets of conductors having no conductors in common.  
9
- 10 26. A connector system according to claim 25, wherein  
11  
12 the pins of the first connector are coupled for signal transmission with the first  
13 set of conductors of the common cable, and  
14  
15 the pins of the second connector are coupled for signal transmission with the  
16 second set of conductors of the common cable.  
17
- 18 27. A connector system according to claim 26, wherein the coupling for signal  
19 transmission comprises electrical coupling.  
20
- 21 28. A connector system for adapting a common cable to carry an IP network  
22 signal set that is normally carried over a first set of conductors and a ATM  
23 network signal set that is normally carried over a second set of conductors,  
24 where  
25  
26 the first and second sets of conductors normally have at least one conductor in  
27 common, and  
28  
29 the common cable comprises a plurality of conductors surrounded by a  
30 common sheath,  
31  
32 the connector system comprising

1 a first connector having pins that carry the IP network signal set, the pins of  
2 the first connector being coupled to a first set of conductors in the common  
3 cable, and  
4

5 a second connector having pins that carry the ATM network signal set, the  
6 pins of the second connector being coupled to a second set of conductors in  
7 the common cable,  
8

9 the first and second sets of conductors having no conductors in common.  
10

11 29. A connector system according to claim 26, wherein  
12

13 the IP network signal set comprises signals for any of 10 Mb/s Ethernet and  
14 100 Mb/s Fast Ethernet, and  
15

16 the ATM network signal set comprises signals for any of ATM 25 Mb/s UTP,  
17 and ATM 155Mb/s UTP.  
18

19 30. A connector system according to claim 29, wherein  
20

21 the IP network signal is normally carried on a conductor set in accord with a  
22 10/100Base-TX cabling scheme, and  
23

24 the ATM network signal set is normally carried on an ATM-25/155 UTP  
25 cabling scheme.  
26

27 31. A connector system according to claim 30, wherein  
28

29 the first set of conductors of the common cable comprise a first set of two  
30 twisted pairs of conductors,  
31

- 1 the second set of conductors of the common cable comprise a second set of  
2 two twisted pairs of conductors,  
3  
4 the first and second sets of two twisted pairs of conductors having no  
5 conductors in common.  
6
- 7 32. A connector system according to claim 31, wherein  
8  
9 the first set of conductors of the common cable comprise conductor pairs (1,  
10 2) and (3, 6), and  
11  
12 the second set of conductors of the common cable comprise conductor pairs  
13 wires (4, 5) and (7, 8).  
14
- 15 33. A connector system according to claim 32, wherein  
16  
17 pins (1, 2) and (3, 6) of the first connector are electrically coupled to  
18 conductor pairs (1, 2) and (3, 6) of the common cable, and  
19  
20 pins (1, 2) and (7, 8), respectively of the second connector are electrically  
21 coupled to conductor pairs wires (4, 5) and (7, 8) of the common cable.  
22
- 23 34. A connector system according to any of claims 28 - 30, wherein the common  
24 cable comprises a single cable of twisted pairs.  
25
- 26 35. A connector system according to claim 34, wherein the common cable  
27 comprises any of a UTP category 3 cable and UTP category 5 cable.  
28
- 29 36. A connector system according to claim 28, wherein  
30  
31 the first set of conductors are coupled for signal transmission with the pins of  
32 the first connector, and

1 the second set of conductors are coupled for signal transmission with the pins  
2 of the second connector.

3

4 37. A connector system according to claim 36, wherein the coupling for signal  
5 transmission comprises electrical coupling.

6

7 38. A connector system for adapting a common cable to carry a first signal set that  
8 is normally carried over a first set of conductors and a second signal set that is  
9 normally carried over a second set of conductors,

10

11 where

12

13 the first and second sets of conductors normally have at least one conductor in  
14 common, and

15

16 the common cable comprises a plurality of conductors surrounded by a  
17 common sheath,

18

19 the connector comprising

20

21 a first connector having pins that carry the first signal set, the pins of the first  
22 connector being coupled to a first set of conductors in the common cable, and

23

24 a second connector having pins that carry the second signal set, the pins of the  
25 second connector being coupled to a second set of conductors in the common  
26 cable,

27

28 the first and second sets of conductors having no conductors in common,

29

30 the first signal set comprising signals in accord with any of the following  
31 standards: 8802-3 (10Base-T), 8802-5 (Token-Ring), FDDI (TP-PMD), ATM  
32 25.6Mbps UTP and ATM 155.52 Mbps UTP, and 100Base-TX (802.3u),

- 1 the second signal set comprising signals in accord with any of the following  
2 standards: 8802-3 (10Base-T), 8802-5 (Token-Ring), FDDI (TP-PMD), ATM  
3 25.6Mbps UTP and ATM 155.52 Mbps UTP, and 100Base-TX (802.3u).  
4
- 5 39. A connector system according to claim 38, wherein the first and second signal  
6 sets comprise signals in accord with the same said standard.  
7
- 8 40. A connector system according to claim 38, wherein the first and second signal  
9 sets comprise signals in accord with different ones of said standards.  
10
- 11 41. A connector system according to claim 38, wherein the common cable  
12 comprises a single cable of twisted pairs.  
13
- 14 42. A connector system according to claim 41, wherein  
15  
16 the pins of the first connector are electrically coupled with the first set of  
17 conductors of the common cable,  
18  
19 the pins of the second connector are electrically coupled with the second set of  
20 conductors of the common cable.  
21
- 22 43. A connector system according to claim 42, wherein  
23  
24 the first set of conductors of the common cable comprise a first set of two  
25 twisted pairs of conductors,  
26  
27 the second set of conductors of the common cable comprise a second set of  
28 two twisted pairs of conductors,  
29  
30 the first and second sets of two twisted pairs of conductors having no  
31 conductors in common.  
32

- 1        44.    A connector system according to any of claims 25, 28 or 38, wherein any of  
2            the first and second connectors is embodied in any of a jack, plug, socket,  
3            patch cord, cable and connector.  
4
- 5        45.    A connector kit comprising two or more connector systems according to any  
6            of claims 25, 28 or 38.  
7
- 8        46.    A connector kit according to claim 45, wherein any of the first and second  
9            connectors is embodied in any of a jack, plug, socket, patch cord, cable and  
10          connector.  
11
- 12       47.    A method of adapting a common cable to carry a first signal set that is  
13            normally carried over a first set of conductors and a second signal set that is  
14            normally carried over a second set of conductors,  
15
- 16       where  
17
- 18            the first and second sets of conductors normally have at least one conductor in  
19            common, and  
20
- 21            the common cable comprises a plurality of conductors surrounded by a  
22            common sheath,  
23
- 24       the method comprising  
25
- 26            connecting connector systems according to any of claims 25, 28 or 38 to ends  
27            of the common cable.

# PC Access Using Two Twisted Pair

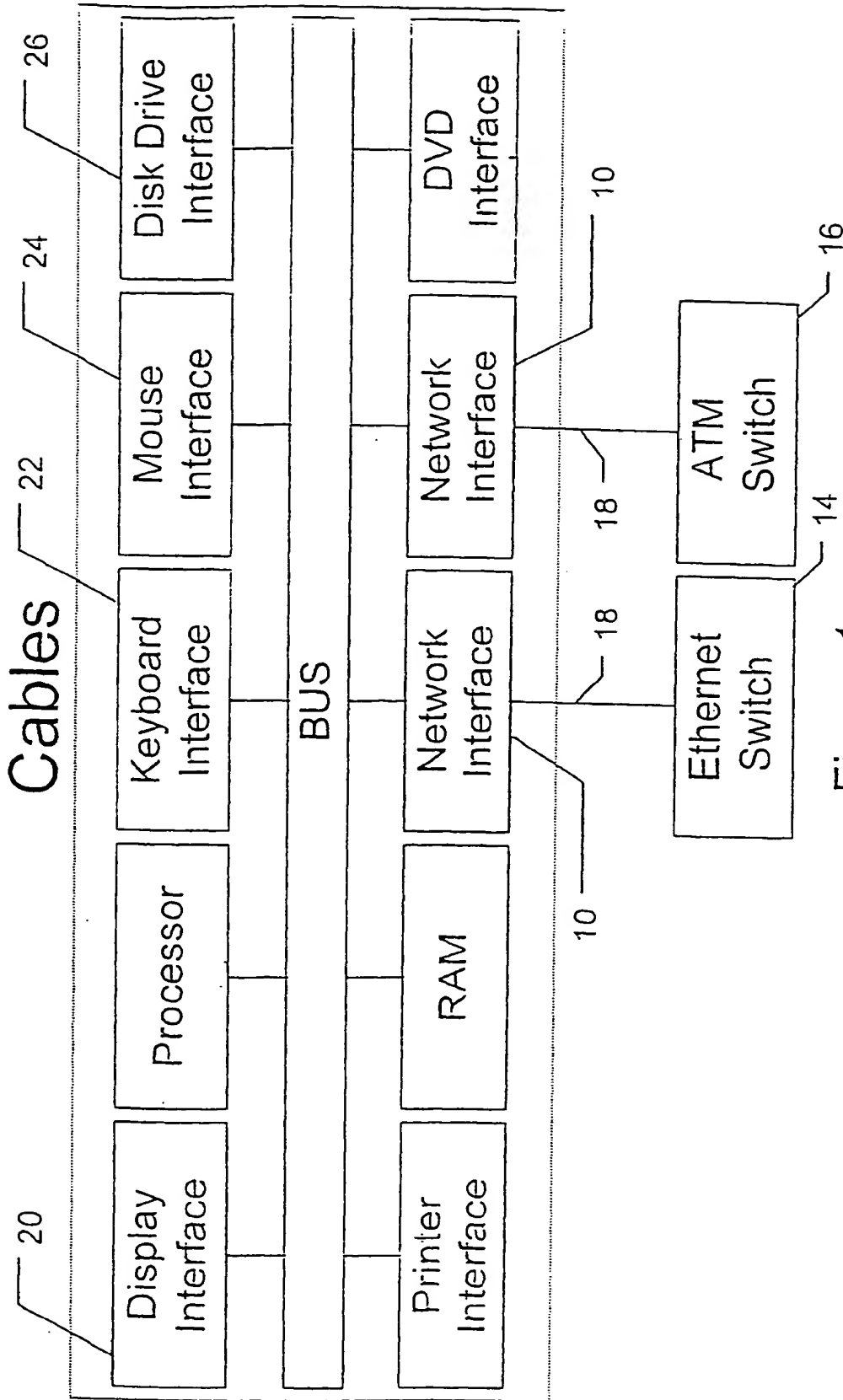


Figure 1  
Prior Art

# Schematic of Wiring for Ethernet Access

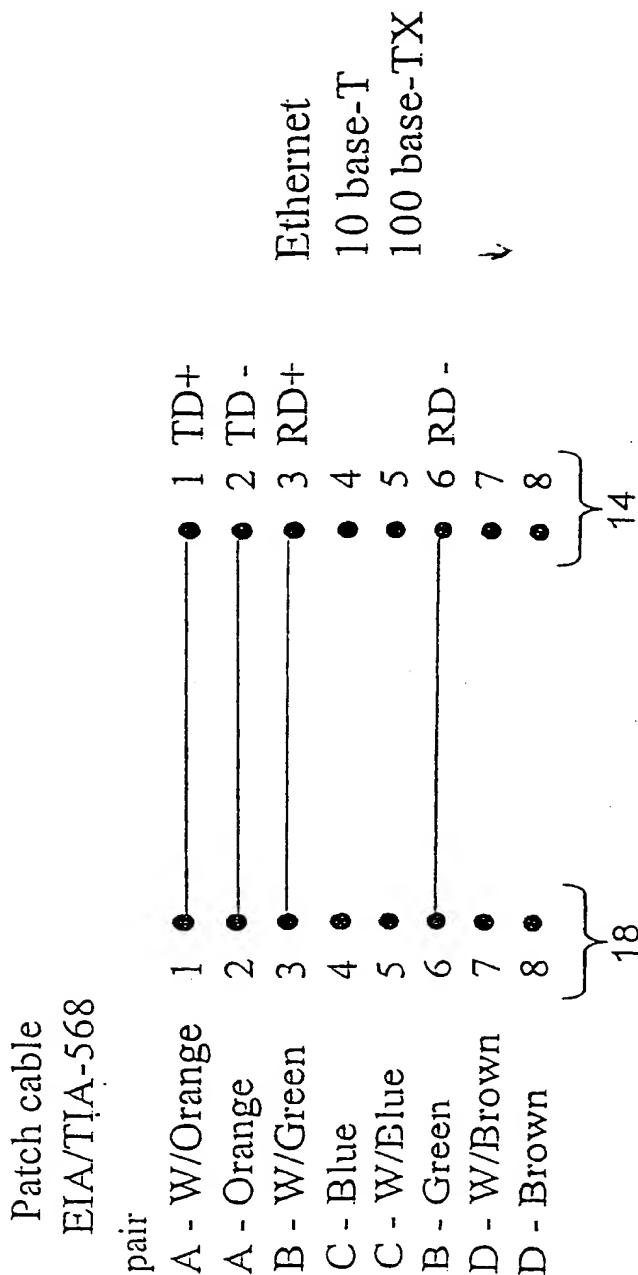
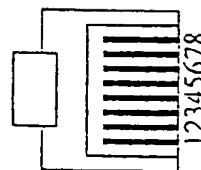


Figure 2  
Prior Art



8-position modular jack



# Schematic of Wiring for ATM Access

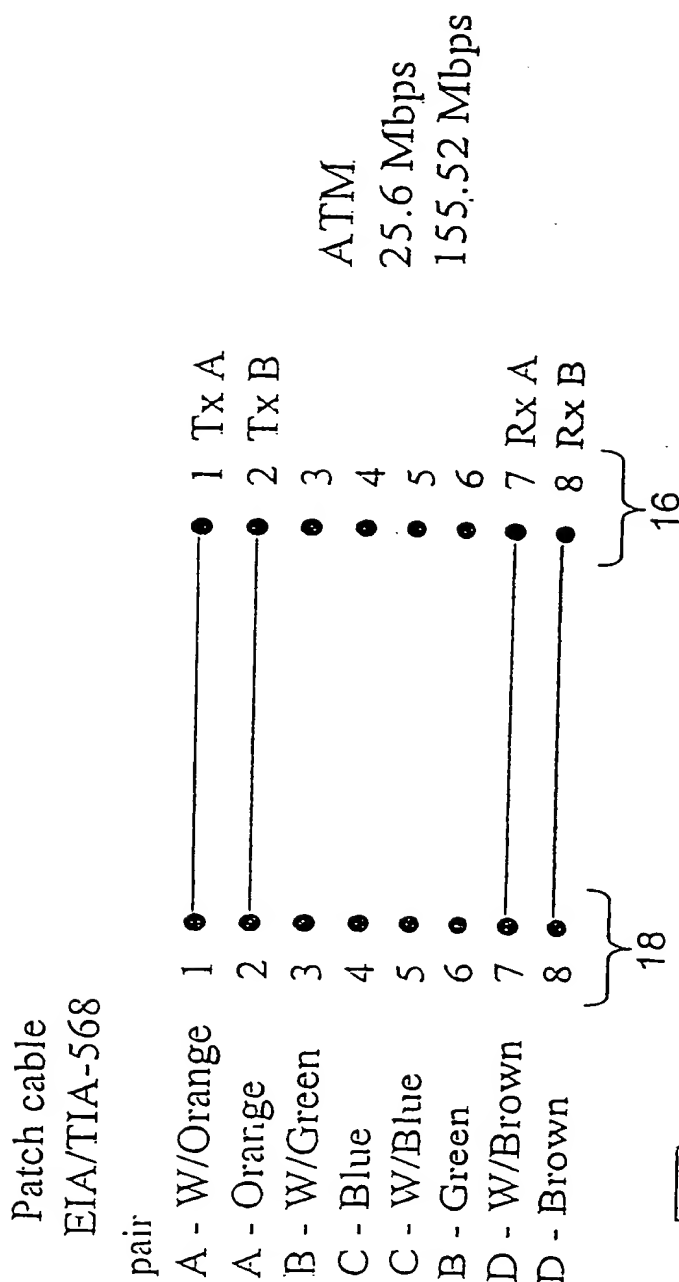
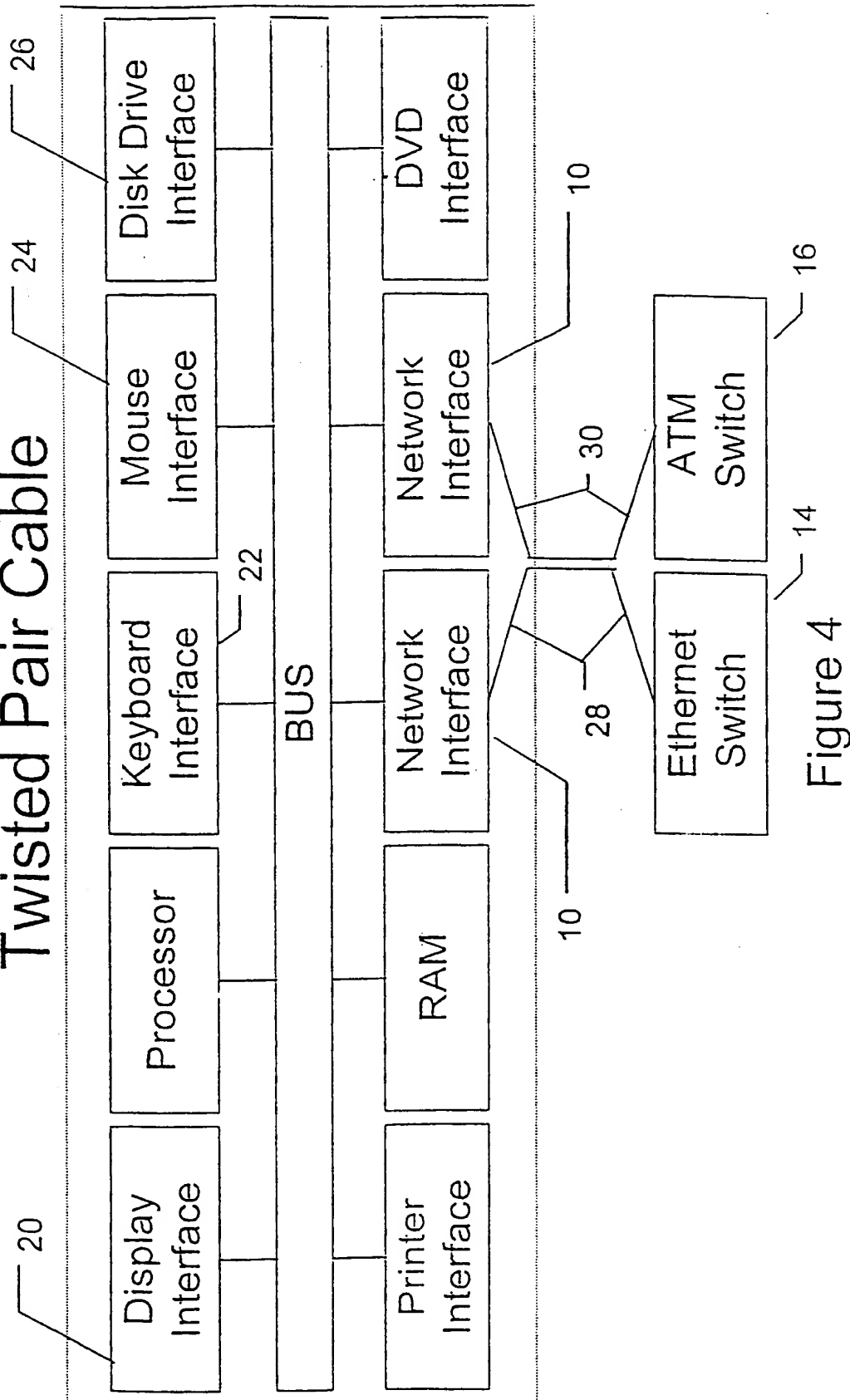


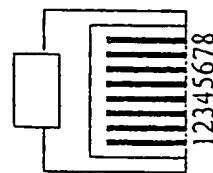
Figure 3  
Prior Art

# PC Concurrent Access on a Single

## Twisted Pair Cable



Ethernet	ATM
10 base-T	25.6 Mbps
100 base-TX	155.52 Mbps



## Figure 5

## 8-position modular jack

## INTERNATIONAL SEARCH REPORT

Inter. Application No

PCT/US 99/15626

## A. CLASSIFICATION OF SUBJECT MATTER

IPC 7 H04L29/08 H04L12/44

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 H04L

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	<p>NILSSON P ET AL: "ANX-HIGH-SPEED INTERNET ACCESS"  ERICSSON REVIEW, SE, ERICSSON. STOCKHOLM,  no. SPEC. INT. ISS,  1 January 1998 (1998-01-01), pages 24-31,  XP000751712  ISSN: 0014-0171  abstract  page 27, left-hand column, line 16 - line 47  page 27, middle column, line 24 - page 28,  middle column, line 32</p> <p style="text-align: center;">-/-</p>	1-43

☒ Further documents are listed in the continuation of box C.☐ Patent family members are listed in annex.

## \* Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"Z" document member of the same patent family

Date of the actual completion of the international search

11 February 2000

Date of mailing of the international search report

24/02/2000

Name and mailing address of the ISA

European Patent Office, P.B. 5818 Patentplan 2  
NL - 2280 HV Rijswijk  
Tel. (+31-70) 340-2040, Tx. 31 651 epo nl,  
Fax: (+31-70) 340-3016

Authorized officer

Adkhis, F

# INTERNATIONAL SEARCH REPORT

Inter. Appl. No.  
PCT/US 99/15626

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT		
Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	<p>SAUNDERS S: "ECONOMICAL VIDEO NETWORK USES UNSHIELDED TWISTED-PAIR WIRING" DATA COMMUNICATIONS,US,MCGRAW HILL. NEW YORK, vol. 19, no. 10, 1 August 1990 (1990-08-01), pages 103-104, XP000137997 ISSN: 0363-6399 page 103, left-hand column, line 16 -middle column, line 3 page 103, left-hand column, line 38 - line 41 page 103, right-hand column, line 18 -page 104, left-hand column, line 7</p>	1-43
A	<p>JOHNS D A ET AL: "INTEGRATED CIRCUITS FOR DATA TRANSMISSION OVER TWISTED-PAIR CHANNELS" PROCEEDINGS OF THE IEEE CUSTOM INTEGRATED CIRCUITS CONFERENCE. (CICC),US,NEW YORK, IEEE, vol. CONF. 18, 1996, pages 5-12, XP000683279 ISBN: 0-7803-3118-4 abstract page 5, left-hand column, line 1 - line 16 page 11, left-hand column, line 26 - line 38</p>	1-43



# PC Access Using Two Twisted Pair

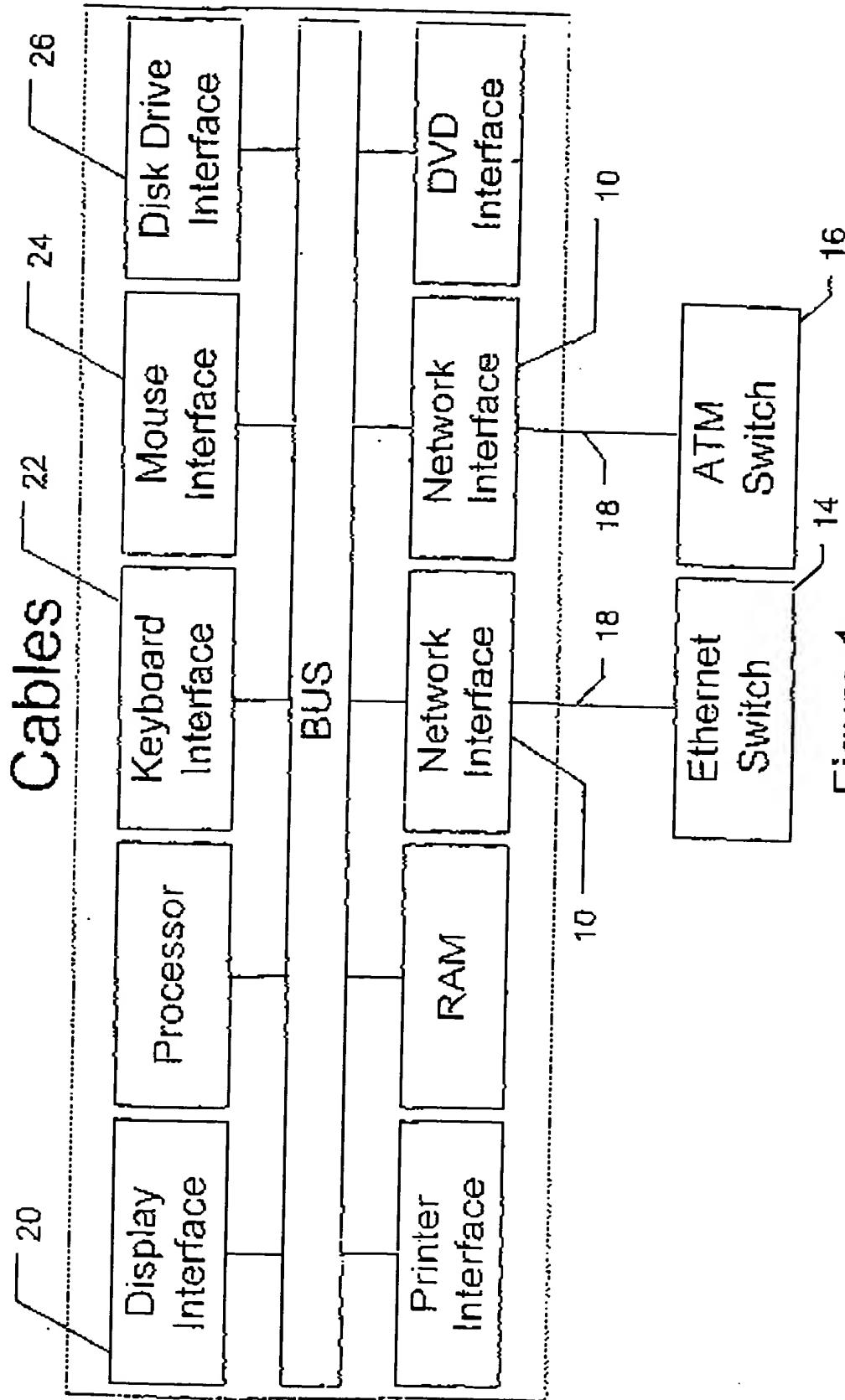


Figure 1  
Prior Art

# Schematic of Wiring for Ethernet Access

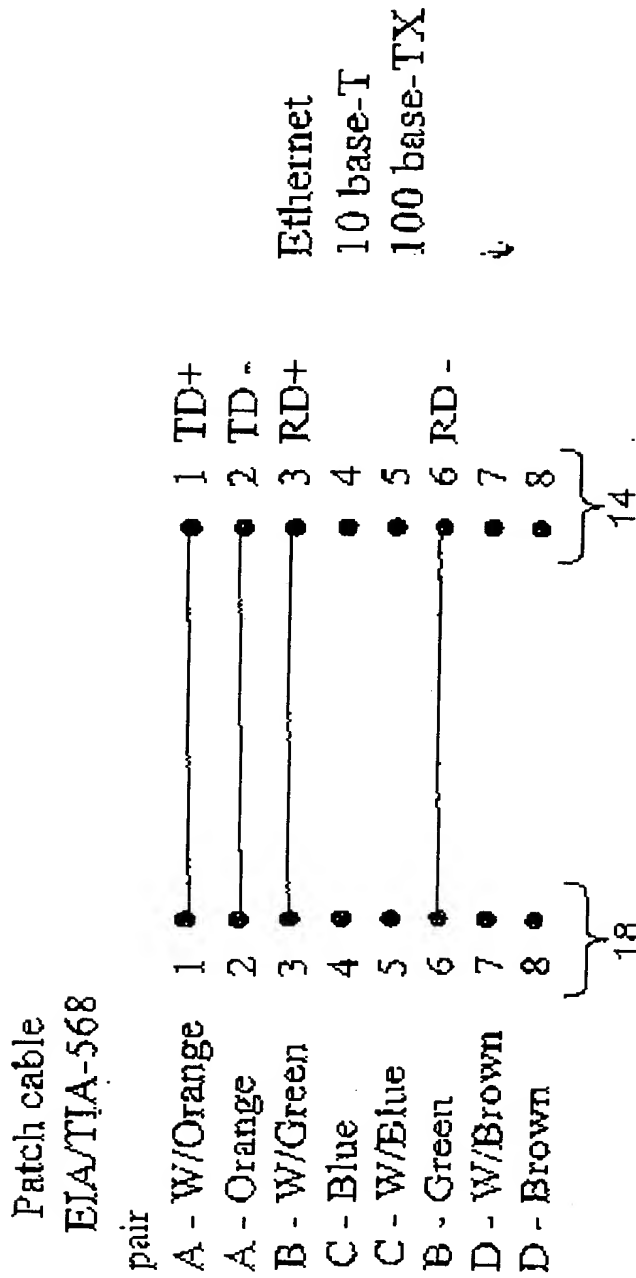
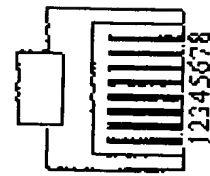


Figure 2  
Prior Art



8-position modular jack



# Schematic of Wiring for ATM Access

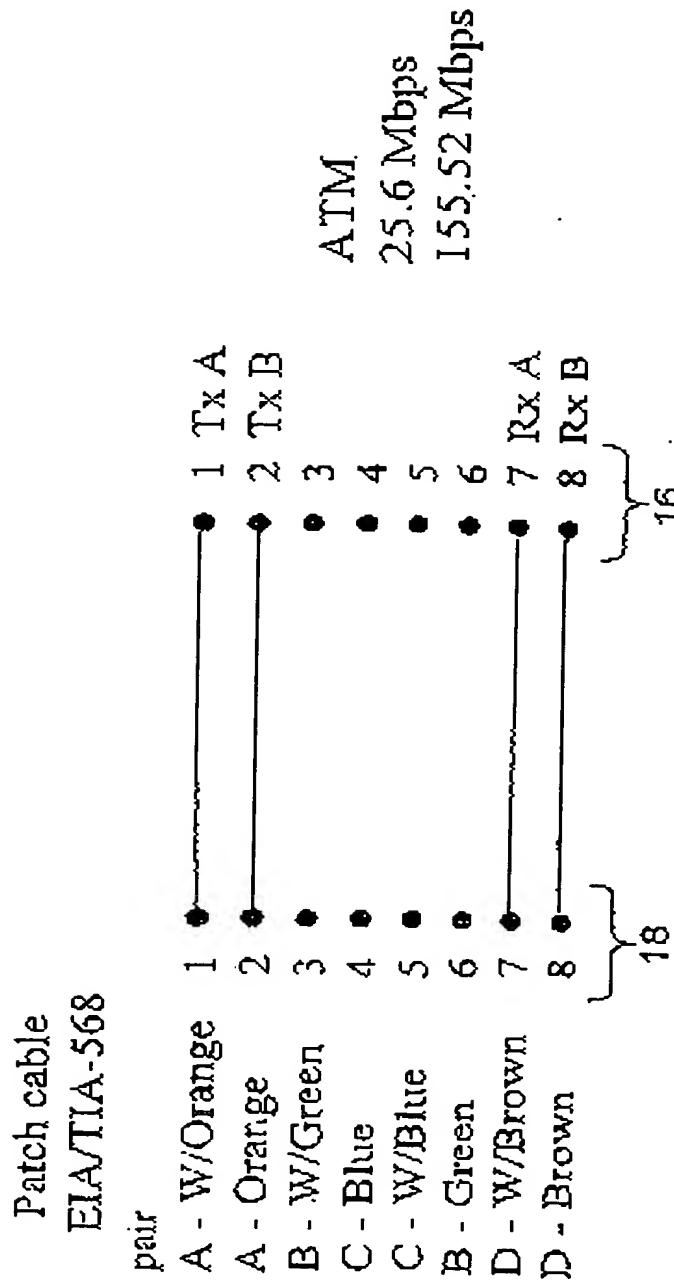


Figure 3  
Prior Art

8-position modular jack

# PC Concurrent Access on a Single

## Twisted Pair Cable

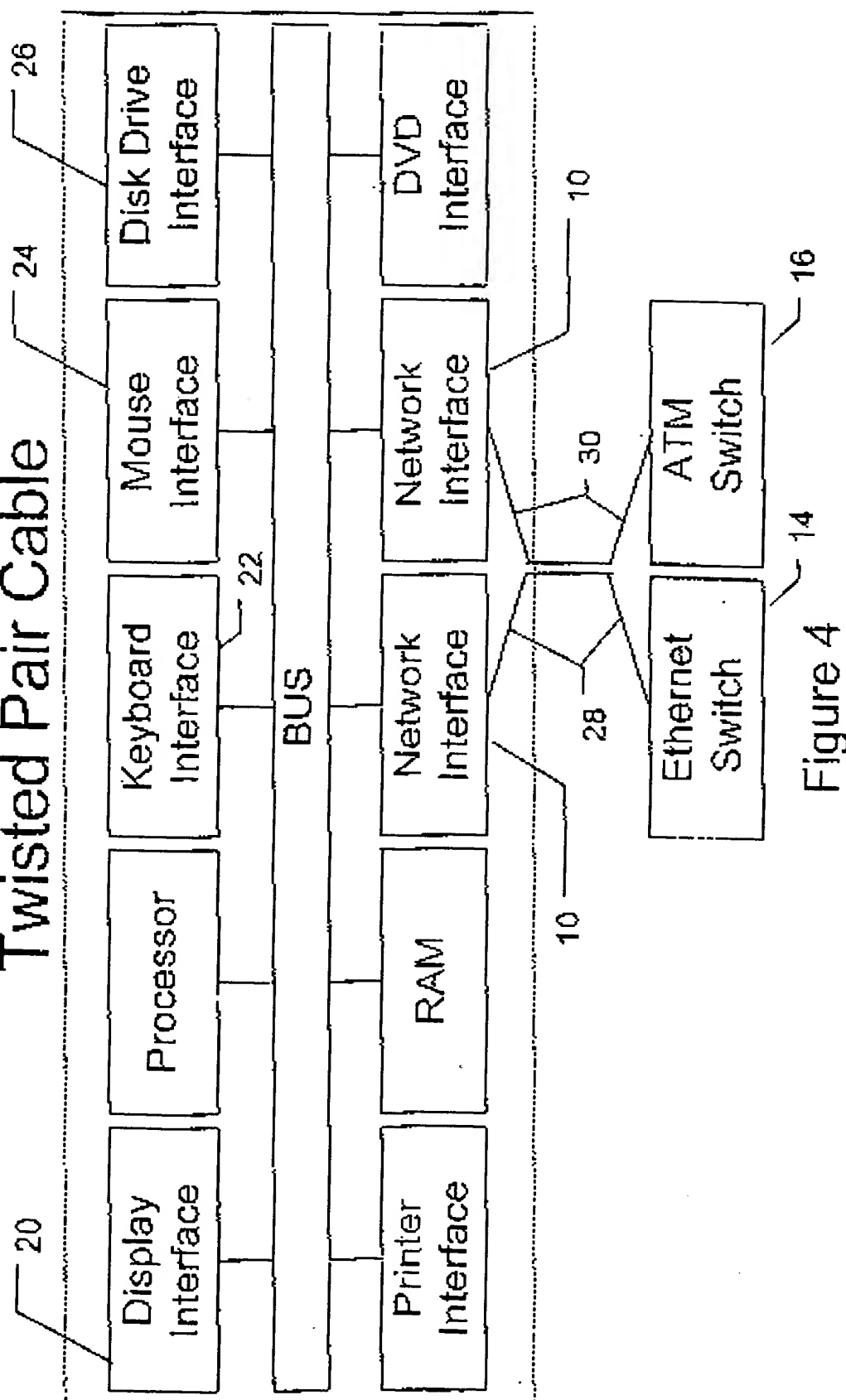
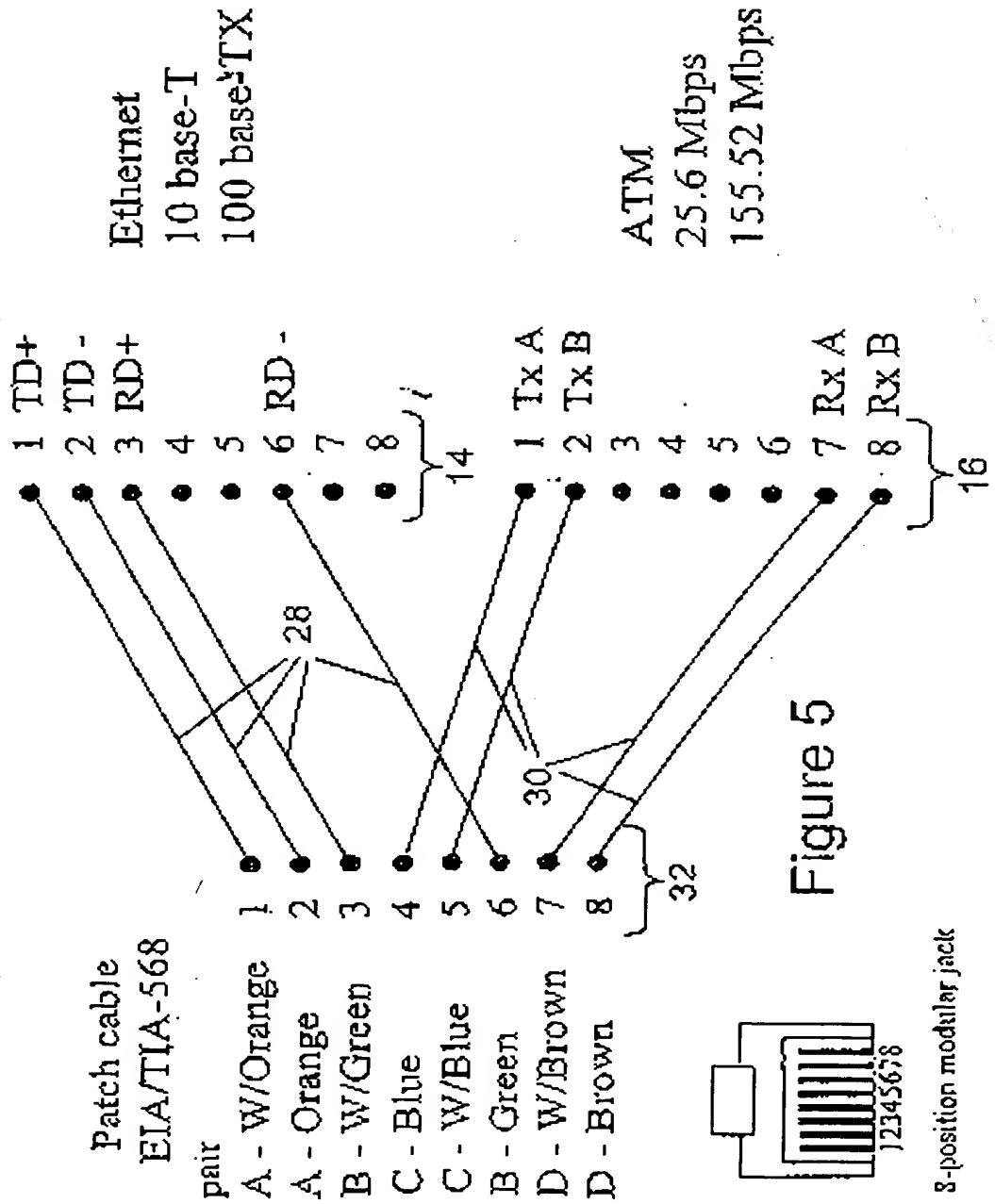


Figure 4

# Schematic of Wiring for Concurrent Access Using a Single Twisted Pair Cable



8-position modular jack

**THIS PAGE BLANK (USPTO)**